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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/905,769	07/13/2001	Roger L. Frick	30203/37265	3575
4743	7590	01/22/2004	EXAMINER	
MARSHALL, GERSTEIN & BORUN LLP 6300 SEARS TOWER 233 S. WACKER DRIVE CHICAGO, IL 60606			AMARI, ALESSANDRO V	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 01/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/905,769

Applicant(s)

FRICK ET AL.

Examiner

Alessandro V. Amari

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14, 15, 18-31, 33-35 and 47 is/are pending in the application.
- 4a) Of the above claim(s) 16, 17 and 36-46 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 29-31, 33-35 and 47 is/are allowed.
- 6) ☒ Claim(s) 1-6, 9-12, 14, 15, 18-22 and 24-28 is/are rejected.
- 7) ☒ Claim(s) 7, 8 and 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11/06/03. 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 4-6, 10, 12, 14, 15, 19-21, 24 and 25 are rejected under 35

U.S.C. 102(e) as being anticipated by Chen et al US Patent 6,433,911.

In regard to claim 1, Chen et al teaches (see Figure 2) an integrated optical device comprising an optical substrate (216), defining a non-guiding propagation region for an incident light signal propagating in a primary direction of propagation under total internal reflection at a surface of the substrate; and a diffractive optical element (218) having a plurality of spaced-apart members formed of an optically transparent material and disposed above the top surface of the substrate such that the incident light signal is reflected within the substrate along a desired direction of propagation as shown in Figure 2 and as described in column 5, lines 24-62.

Regarding claim 4, Chen et al discloses that the members are a plurality of strips that are substantially parallel as shown in Figure 2.

Regarding claim 5, Chen et al discloses that the plurality of strips each have a substantially identical strip width as shown in Figure 2.

Regarding claim 6, Chen et al discloses that the plurality of strips are each spaced apart a substantially equal spacing distance as shown in Figure 2.

Regarding claim 10, Chen et al teaches that the members are formed of a material selected from the grouping consisting of amorphous silicon, crystalline silicon and poly-silicon as described in column 5, lines 63-67 and column 6, lines 1-6.

Regarding claim 12, Chen et al teaches (see Figure 2) that the incident light signal propagates as a first unguided wave within the substrate, wherein the diffractive optical element is disposed to reflect the incident light signal as a second unguided wave within the substrate and wherein the members are disposed in direct contact with the surface of the substrate as shown in Figure 2 and as described in column 5, lines 24-62.

Regarding claim 14, Chen et al discloses that the diffractive optical element produces a first order diffracted mode that travels within the substrate in the desired direction of propagation at an angle to the primary direction of propagation as described in column 5, lines 24-62.

Regarding claim 15, Chen et al discloses that the first order diffracted mode travels within the substrate under total internal reflection as described in column 5, lines 24-62.

Regarding claim 19, Chen et al discloses that the members are substantially parallel linear elements as shown in Figure 2.

Regarding claim 20, Chen et al teaches that the members are formed on the top surface of the substrate by depositing a silicon material in a patterned form. It should

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be noted that this claim is a product-by-process claim, which is the same as a product from the prior art, and is therefore unpatentable even though the prior product was made by a different process. [*In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966] See MPEP 2113.

Regarding claim 21, Chen et al teaches that the members and substrate are formed of the same material as described in column 5, lines 55-57.

Regarding claim 24, Chen et al discloses that the diffractive optical element operates by means of total internal reflection as shown in Figure 2.

Regarding claim 25, Chen et al teaches (see Figure 2) that a plurality of incident light signals propagating within the substrate each having a different wavelength and wherein the diffractive optical element reflects each channel into a different first order diffracted mode such that each reflected light signal travels within the substrate in one of plurality of secondary directions of propagation each at an angle to the primary direction of propagation each reflected channel traveling within the substrate under total internal reflection as described in column 5, lines 24-62.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 3, 11 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al U.S. Patent 6,433,911.

Regarding claims 2, 3, 11 and 22, Chen et al teaches the invention as set forth above but does not teach that the substrate is formed of quartz or sapphire that the members are formed of a material selected from the grouping consisting of alumina, sapphire, silicon nitride, and an alloy of poly-silicon and poly-germanium or that the members and substrate are formed of sapphire. It would have been obvious to one having ordinary skill in the art at the time the invention was made to select the materials cited above, since it has been held to be within the ordinary skill of a worker in the art to select a known material on the basis of its suitability for the intended use. One would have been motivated to utilize the materials cited above for the purpose of forming an optical waveguide which guides the optical wave very efficiently through the waveguide.

5. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al U.S. Patent 6,433,911.

Regarding claim 18, Chen et al teaches the invention as set forth above but does not disclose the light beam is coupled into the substrate through a GRIN lens.

Official Notice is taken that it is notoriously old and well known to utilize GRIN lens in the optical device art.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a GRIN lens in the optical device of Chen et al in order to achieve high quality coupling. It is noted as directed by the MPEP 2144.03 that if the applicant does not seasonably traverse the well-known statement during examination, then the object of the well-known statement is taken to be admitted prior art. *In re*

Chevenard, 139 F.2d 71, 60 USPQ 239 (CCPA 1943). As such, the official notice statement of the examiner is now held to be admitted prior art.

6. Claims 9 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al US Patent 6,433,911 in view of Shikama US Patent 4,753,513.

Regarding claims 9 and 26, Chen et al teaches the invention as set forth above but does not teach that the thickness or width of the members is adjusted.

Regarding claims 9 and 26, Shikama does teach that the thickness or width of the members is adjusted to maximize the intensity of the reflected light signal as shown in Figure 5 and as described in column 8, lines 8-68.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the thickness or width of the members of Chen et al as taught by Shikama to maximize the intensity of the reflected light signal.

7. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al US Patent 6,433,911 in view of Shiono et al US Patent 5,561,558.

Regarding claims 27 and 28, Chen et al teaches the invention as set forth above but does not teach regarding claim 27 that the widths and the spacings of the member strips vary among the strips or regarding claim 28 that the widths and the spacings vary in a continuous manner.

Regarding claims 27 and 28, Shiono et al does teach that the widths and the spacings of the member strips vary among the strips and that the widths and the spacings vary in a continuous manner as shown in Figures 4 and 6 and as described in column 3, lines 17-52.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the widths and spacings of Chen et al as taught by Shiono et al in order to provide for higher diffraction efficiency over the entire area of the structures.

Allowable Subject Matter

8. Claims 7, 8 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
9. Claims 29-31, 33-35 and 47 are allowed.
10. Claim 7 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "the plurality of strips each have a substantially identical strip width, the plurality of strips are each spaced apart a substantially equal spacing distance, and the spacing distance is substantially identical to the strip width" as set forth in the claimed combination. Claim 8 is also allowable based on its dependence on claim 7.

Claim 23 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "the members have a higher index of refraction than that of the substrate" as set forth in the claimed combination.

Claim 29 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "wherein the light signal is incident upon the diffraction grating at an angle, θ , above a critical angle, θ being measured from a normal to the top surface of the substrate extending into the substrate, and wherein the sum a

is chosen such that θ_p is greater than 90° and less than 180° as set forth in the claimed combination. Claims 31 and 33-35 are also allowable based on their dependence on claim 29.

Claim 47 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "the members are disposed in evanescent field coupling contact with the top surface of the substrate" as set forth in the claimed combination.

The prior art of record, Chen et al, Shiono et al and Shikama teach an integrated optical device which comprises a substrate wherein an incident light signal is propagating within the substrate in a primary direction of propagation reflecting off a surface of the substrate under total internal reflection; and a diffractive optical element having a plurality of spaced-apart members formed of an optically transparent material and disposed above the top surface of the substrate such that the incident light signal is reflected within the substrate along a desired direction of propagation and wherein the members are a plurality of strips and wherein the strips are adjusted to maximize the intensity of the reflected light. However, Chen et al, Shiono et al and Shikama do not teach the specific physical characteristic of the strips and relationships of distances and widths as claimed and there is no motivation or teaching to modify this difference as derived.

Response to Arguments

11. Applicant's arguments with respect to claims 1-6, 9-12, 14, 15, 18-22 and 24-28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (703) 306-0533. On January 20, 2004, the telephone number will be changed to (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (703) 305-0024. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318.


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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ava *ava*
05 January 2004


MARK A. ROBINSON
PRIMARY EXAMINER